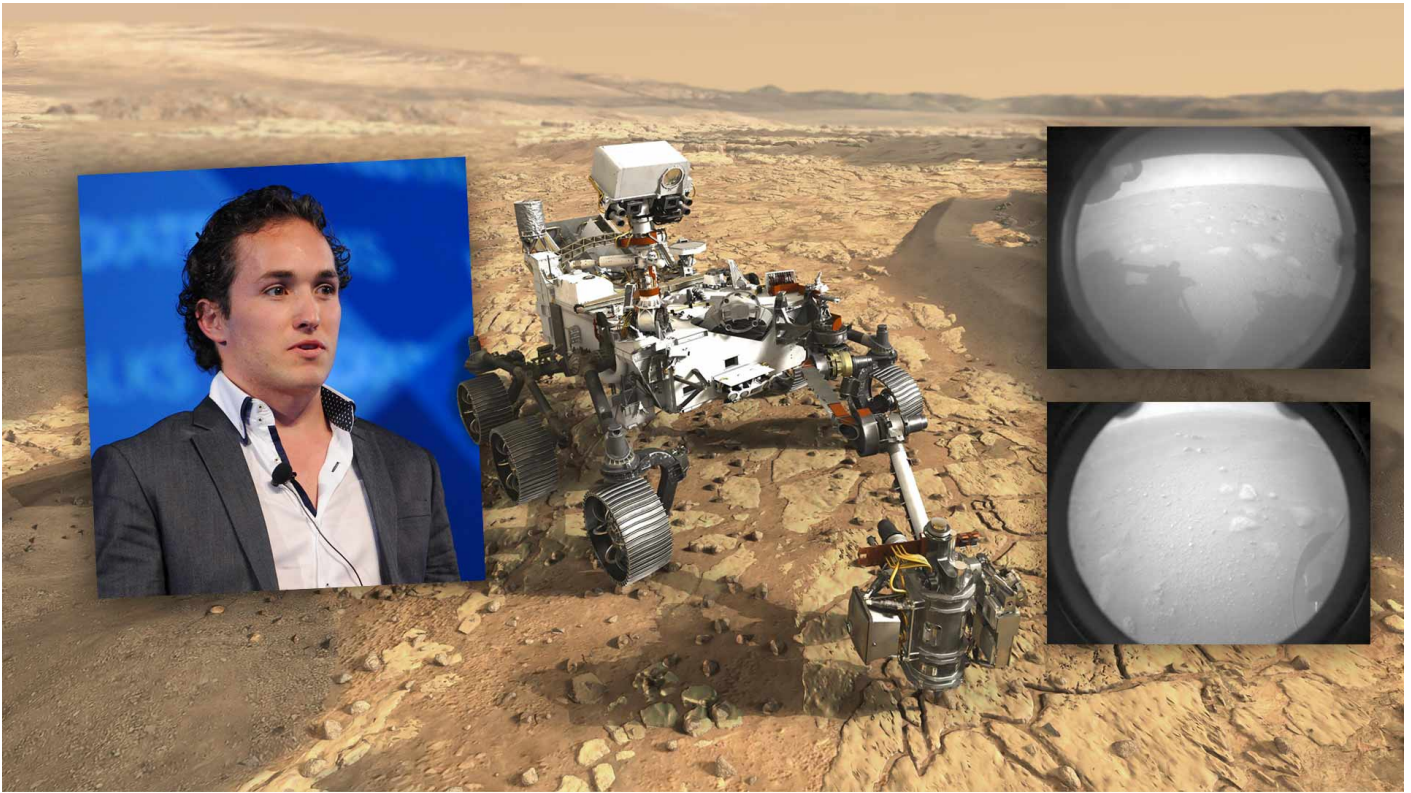


The Mexican who helped on the Martian robot arm



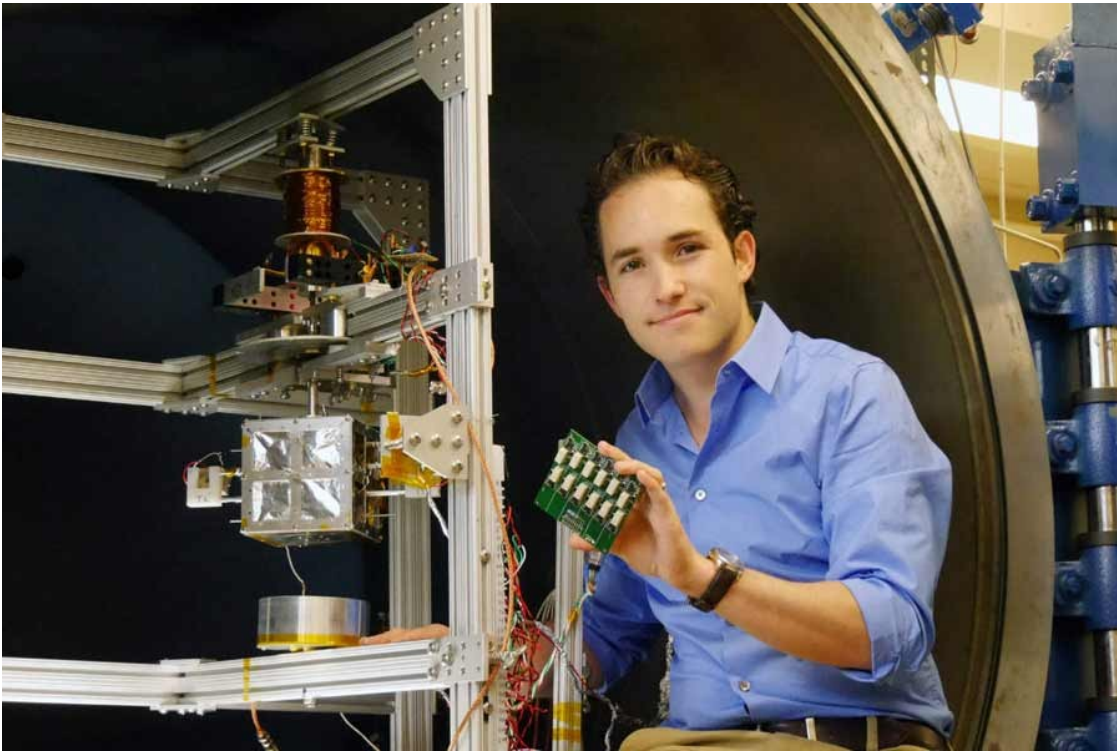
*"I remember applying for about **100 research projects** in the United States and **only being accepted for 3 or 4**. I needed a lot of **perseverance** to continue on after that."*

The same **perseverance** that **Fernando Mier-Hicks** is talking about led him to fulfill his **childhood dream** of working at **NASA** on a robot with that name: the **Perseverance rover**.

This Mexican helped in the **creation** of **simulators** and in testing the **robotic arm** on the **rover**, which successfully landed on **Mars** this past February 18th.

*"I was very nervous. You're betting **years of work** on everything going well. It was a relief once it landed. We're very happy and excited to see **what we discover on Mars**."*

Fernando holds a degree in **Mechatronic Engineering** from **Tec de Monterrey** with a **master's** and a **doctorate** in **Aerospace Engineering** from **Massachusetts Institute of Technology (MIT)**.



His work on the MARS 2020 mission

Fernando, 31, works at the **Jet Propulsion Laboratory (JPL)**, in charge of the **MARS 2020 mission**, where he was assigned to **help test the robot's systems**.

*“(For example), the sample collection system is the **most complex robotic system we’ve ever sent to another planet**. It has **17 engines** and sending 17 engines into space has many challenges,”* he said in an interview with **CONECTA**.

For the **robotic arm**, he created an **electrical simulator** that sent the **appropriate signals** for **correct movement**.

*“In this way, we were able to test the arm and **check that it could be moved at the appropriate speed** to connect it to the rover’s computer.”*

Fernando had to work around the clock **to learn the robot’s systems** and work with **different specialists**.

*“There were **100 people** working on the **robotic arm** alone, and you have to coordinate with other areas to make everything work,”* he said.



Fernando's perseverance

The native of **Aguascalientes** knew that to **fulfill his dream**, he had to go to **graduate school** at a **prestigious university** in the United States.

To achieve this, he **built up his résumé** through **research stays** while studying at **Tec de Monterrey**.

*"I knew **I needed those stays** to be accepted to universities in the United States. **It was something I had to do**. It was my responsibility and my own **motivation**."*

*"**The Tec allowed me to get to where I am**. Many of these stays wouldn't have been possible if I hadn't gone to the Tec."*

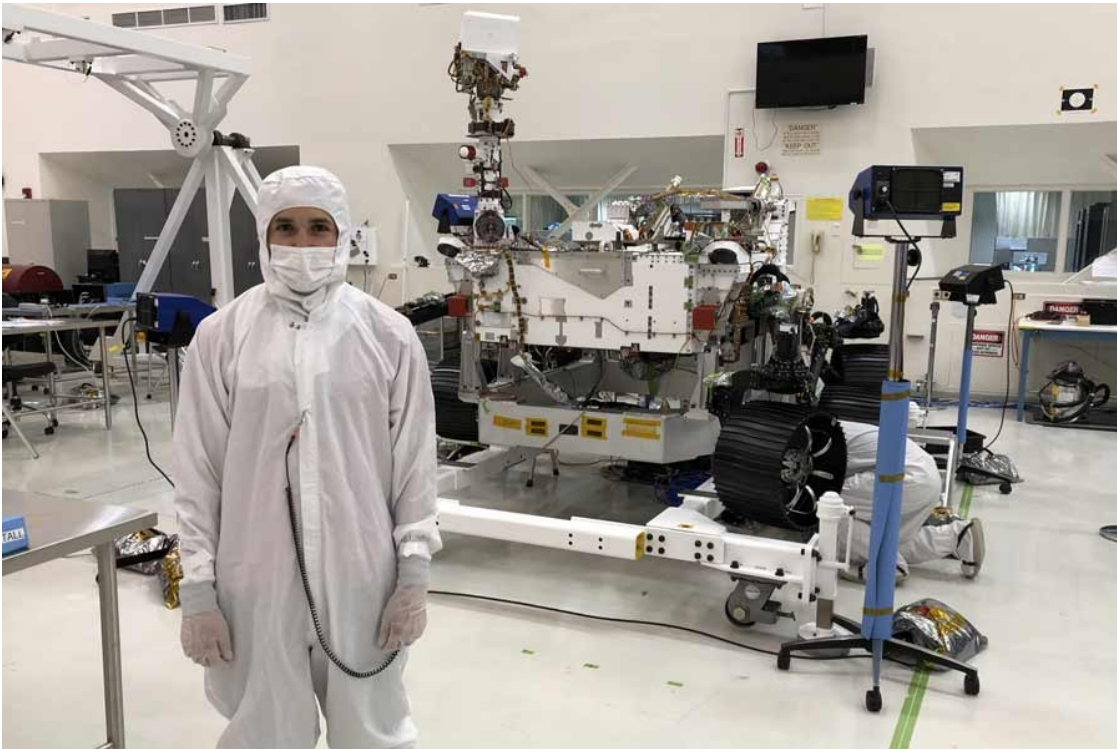
<https://twitter.com/NASAPersevere/status/1362829136385896452>

After completing them and **graduating**, he was accepted to **MIT** for the master's program in **Aerospace Engineering**, which he completed successfully.

To transition to a **doctorate** at the same university he had to pass an **admission exam** that has a **success rate** of **50%** among **MIT** students.

That **moment was critical in his life**, he says, because if he didn't pass it, he was going to return to Mexico.

“What I did was study 4 hours a day for 6 months, with a timer. That’s how I was able to pass it.”



The robot that will search for Martian life

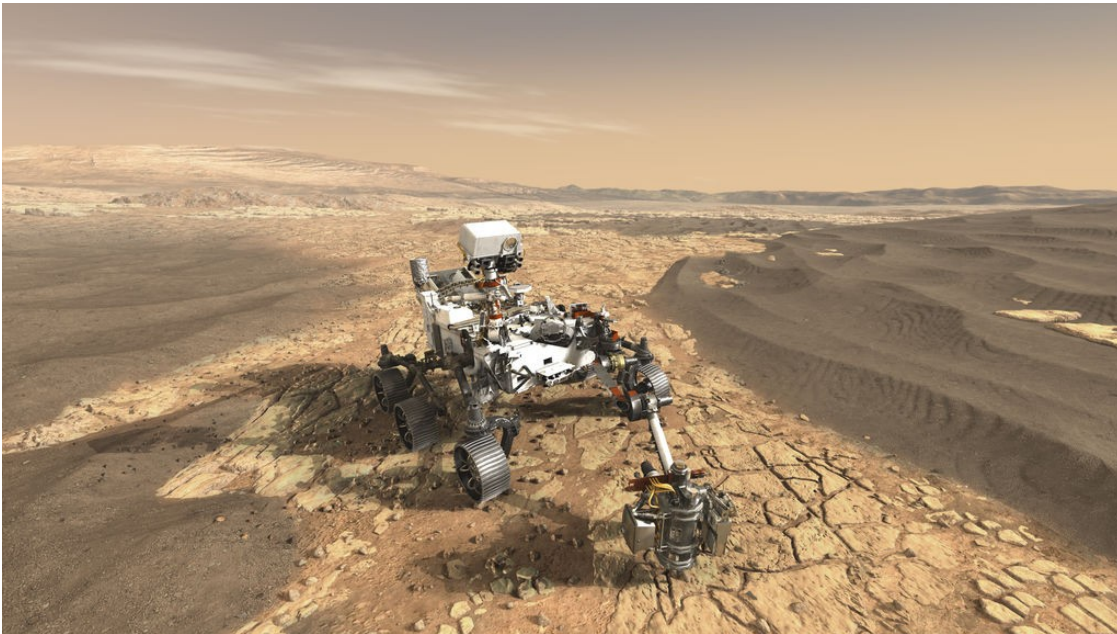
Perseverance will collect samples from **Martian soil** to prepare them for return to **Earth** in **10 years’ time**, in order to **look for signs of** microscopic or fossil life.

*“Inside the robot there’s practically an entire **canning factory** that seals the samples tightly. Testing and designing this whole system was very complicated,”* he said.

The robot took **10 years** to design, and **all the components were assembled** at the same time **3 years** before its launch.

*“Everything starts to **get built in different parts of the lab**. At some point, they come together like a **giant Lego set**. Before this, we have to **make sure that each piece works perfectly** and communicates with the other parts of the robot,”* he said.

He added that the mission takes with it a helicopter **called Ingenuity**, making this the first time a **small drone** will fly on **Mars**.



His “blastoffs” before NASA

Fernando remembers that as a **child**, he liked to **take apart** his toys, cars, and planes. He then began **launching small rockets**, so he thought about **inventing chemicals** to improve their **propulsion**.

*“(At 15) a compound **exploded in my hand**, and I got a **third-degree burn**. I was in the hospital for a week. From then, on I gave up chemistry and **focused more on robotics**, which is safer.”*

When he started college, his **future became clear**: to find a way to get into NASA, he recalled.

For example, he entered the **space propulsion laboratory** at MIT, run by the **Mexican Pablo Lozano**, to work on the development of **electric thrusters for nanosatellites**.

Along with others, he even founded the **Action Systems startup** to market these thrusters.

“(This startup) is still going, with 50 employees. For personal reasons, I decided not to work on it, and that’s why I joined NASA.”

For this work, Fernando was recognized by the **MIT Technology Review in Spanish** as one of the winners of the **2016 Innovators under the age of 35 in Mexico**.

“I was very nervous. You’re betting years of work on everything going well. It was a relief once it landed. We’re very happy and excited to see what we discover on Mars.”



Space missions, the source of everyday technologies

Fernando said that **great technological advances** in **today's society** are the result of **space exploration**.

*"The **technology** that was developed to **send people to the Moon** is the reason we have **Uber**, **Google Maps**, and **GPS** on our cell phones."*

*"It's hard to say now what the technology from **Perseverance** will give us in 50 years' time. **Perhaps humans will have already landed on Mars, which would be impossible without having had rovers on Mars**, without knowing what the planet's made of, without having studied it."*

He clarified that **humans stepping on the surface of Mars** is more complicated than going to the **Moon**,

*"There has to be a **political spark** for **NASA to invest** the necessary resources, or if not, a **commercial company like SpaceX** will arrive there sooner."*

"The technology that was developed to send people to the Moon is the reason we have Uber, Google Maps, and GPS on our cell phones."

The ancestors of Perseverance

Fernando mentioned that the **first missions** on the surface of Mars were **Viking 1 and 2** in the '70s, which were "**lander**" robots that **didn't move**.

In the '90s, NASA launched the **first mobile rover**: the *Mars Pathfinder*, which was the size of a **microwave oven**.

*"It was the first experiment to determine whether rovers could be sent to Mars. After that experience, NASA then sent the twin robots *Spirit and Opportunity*," Fernando said.*

In 2012, NASA sent the **Curiosity rover**, the size of a small one-ton car.

*"Perseverance is a twin to **Curiosity**, about the same size and weight, but whose difference is its mission: **to collect Martian samples and prepare them for return and subsequent study on Earth**.*

*"The previous strategy was to **study Mars on Mars**. Now we're **bringing Mars to Earth** with the best instruments we have on the planet," Fernando stressed.*

His future plans

Fernando mentioned that he's now being trained to drive **Curiosity**, which is still active, and then to drive **Perseverance**,

*"Like learning to drive in Mexico, I'm being trained to **drive** the "old car" before **driving the latest model**."*

He also noted that **NASA** has to prepare at least **two more missions to Mars** to **collect the samples from Perseverance**. He estimates that this will take 10 to 15 years.

*"Further in the future, we'll be exploring the **frozen moons of Jupiter and Saturn**, entirely new, very interesting worlds. We're very excited that **one day we'll be able to send missions to those bodies in the solar system**."*

If you want to work at NASA, start now

Fernando's **advice** is that when it comes to **competitive issues**, such as getting into U.S. universities or NASA, **the earlier you start building up your résumé, the better**.

*"If someone wants to work at NASA, they need to have a PhD in an area relevant to NASA. To be accepted onto that doctorate program, **you need to have done a lot of things at college**.*

"If you're in high school or at university, it's time to think, decide, and start working toward your goal.

*"If you decide you want to work at NASA at the end of your degree, it might be too late, because you didn't do what you should've been doing during your studies. **The earlier you start, the better**."*

The **Perseverance rover** took off for Mars on July 30, 2020. After traveling 471 million kilometers, it landed in Jezero Crater on February 18, 2021 for an estimated mission length of one Martian

year (687 Earth days).

With information from Jorge Pintor.

YOU'LL DEFINITELY WANT TO READ THIS TOO:

<https://tec.mx/en/news/leon/education/prometheus-only-mexican-robot-international-competition>